

PRESENT STATUS OF *AMBLYOLEPIS*
(ASTERACEAE: HELIANTHEAE)

MARK W. BIERNER

Department of Biology, Southwest Texas State University,
San Marcos, TX 78666

ABSTRACT

Amblyolepis, a taxon of Texas and northeastern Mexico, is recognized as a monotypic genus in subtribe Gaillardinae, possibly most closely related to *Hymenoxys*. Although chromosome numbers of $2n=18_{II}$, $18_{II} + 1_I$, 19_{II} , $19_{II} + 1_I$, and 20_{II} are reported, only one infrageneric taxon (*A. setigera*) is recognized, because there are no distinguishing morphologic characters that correlate with chromosome number. This taxonomic treatment takes into account all known morphologic, chemical, and cytologic data.

RESUMEN

Amblyolepis, un taxón que se encuentra de Tejas y en el nordeste de México, es reconocido como un género monotípico en la subtribu Gaillardinae, que está posiblemente relacionada con *Hymenoxys*. Aunque los números de cromosomas de $2n=18_{II}$, $18_{II} + 1_I$, 19_{II} , $19_{II} + 1_I$, y 20_{II} son reportados, solamente un taxón intragenérico (*A. setigera*) es reconocido ya que no hay características morfológicas que se correlacionen con el número de cromosomas. Este tratamiento taxonómico toma en cuenta todos los datos morfológicos, químicos y citológicos conocidos.

The monotypic genus *Amblyolepis* DC. consistently has been placed close to *Helenium* L. and *Gaillardia* Foug. (De Candolle 1836; Torrey and Gray 1842; Rydberg 1915; Correll and Johnston 1970; Robinson 1981), and at times it has even been treated as congeneric with *Helenium* (Bentham and Hooker 1873; Hoffmann 1894). Gray (1874, p. 201), however, responded to Bentham's (Bentham and Hooker 1873) reduction of *Amblyolepis* to a section of *Helenium* by stating, "I cannot at all accept the idea that *Amblyolepis* DC. belongs to this genus." He then itemized a number of differences between the two genera including vestiture, leaf shape, leaf punctation, inner involucre bract morphology, and achene and disc corolla morphology.

Indeed, there is no other taxon in subtribe Gaillardinae that has anything in common with *Amblyolepis* in regard to the above mentioned characters. Of particular note are the leaves, which lack impressed glands, the inner involucre bracts, which are hyaline and resemble pappus scales, the achenes, which are very strongly 10-ribbed, and the disc corollas, which have long, slender tubes, funnel-form throats, and relatively long, acuminate lobes.

Gray (1874, p. 201) also commented that *Amblyolepis* has "... somewhat the odor of *Melilotus* in drying." This undoubtedly is due

to the presence of coumarin (Herz and Bhat 1970), a compound that has not been reported from any other taxon in subtribe Gaillardinae. While this in itself is a notable chemical difference between *Amblyolepis* and the rest of the subtribe, it is probably more significant that Herz and Bhat (1970) were unable to detect any sesquiterpene lactones in *Amblyolepis setigera*, even though they were looking specifically for these compounds when they extracted some five kilograms of dried plant material. Sesquiterpene lactones are abundant in, and rather easily isolated from, other genera in the subtribe, especially *Helenium* and *Gaillardia* (Yoshioka et al. 1973; Herz 1977; Swain and Williams 1977; Seaman 1982).

Flavonoid chemistry of *Amblyolepis* is also quite distinct from that of *Helenium* and *Gaillardia*. *Amblyolepis* has been found to contain flavonols (Bierner 1979), while *Helenium* and *Gaillardia* have thus far been reported to contain only flavones (e.g., Wagner et al. 1972a; Bierner 1973, 1987; Averett and Beaman 1975; Bohm 1977). Furthermore, the compounds in *Amblyolepis* were flavonol galactosides, which have only rarely been isolated from other taxa in the subtribe (Wagner et al. 1972b, c). The occurrence of quercetin 3-*O*-galactoside and isorhamnetin 3-*O*-galactoside in both *Amblyolepis* (Bierner 1979) and *Hymenoxys* Cass. (Wagner et al. 1972c) could be dismissed as coincidental, because the same compounds have been reported from other, phylogenetically remote species, including members of the Cactaceae and Guttiferae (Harborne and Williams 1975). These chemical similarities, however, may be indicative of a true relationship between *Amblyolepis* and *Hymenoxys*, and it is notable that recent chloroplast DNA work (Kim et al. 1989, personal communication) also suggests a connection between these two genera.

Cytologically, *Amblyolepis setigera* has been reported to be $n=19$ (Turner 1959, 1978; Raven and Kyhos 1961) and $n=18$ (Harms 1969). Also, there are voucher specimens at LL and US (Powell and Turner 2730) indicating a count of $n=17$ attributed to Powell; however, Powell (personal communication) could find no record of this when asked if further information might be available.

I have found populations containing plants with chromosome numbers of 18, 19, and 20 pairs plus univalents in various combinations, as presented in Table 1. In population *Bierner 88-41*, precocious division of one bivalent in plants with $2n=20_{II}$ made some of the microsporocytes appear to be $2n=19_{II} + 2_1$. This also occurred in population *Bierner 88-45*, with $2n=19_{II}$ appearing to be $2n=18_{II} + 2_1$ in one plant. The count of $2n=18_{II} + 3_1$ in *Bierner and Rader 51200*, therefore, may actually have been $2n=19_{II} + 1_1$.

The predominant chromosome number in *Amblyolepis setigera* is $2n=18_{II}$. The variant numbers are scattered randomly throughout a

TABLE 1. CHROMOSOME NUMBERS IN *AMBLYOLEPIS SETIGERA*. Bud material was fixed in a modified Carnoy's solution: chloroform, absolute ethanol, and glacial acetic acid (4:3:1; V:V:V). The chromosomes were stained with acetocarmine, and counts were obtained from microsporocytes at diakinesis or metaphase I. All collection numbers are those of M. W. Bierner, and vouchers are deposited at TEX. Exact locality data can be found in the list of representative and cytologic voucher specimens.

Chromosome numbers ($2n$)	Vouchers
18_{II}	MEXICO. Coahuila, 51213. USA. Texas, Coleman Co., 88-16. Jones Co., 88-10, 88-12, 88-13. Karnes Co., 88-20. Live Oak Co., 51520, 88-28. Llano Co., 88-1. McCulloch Co., 88-17. San Saba Co., 88-3, 88-5.
$18_{II}; 18_{II} + 1_I$	Texas, Karnes Co., 88-24. McCulloch Co., 88-18.
$18_{II}; 19_{II}$	Texas, Val Verde Co., 88-45.
$18_{II} + 1_I; 18_{II} + 3_I$	Texas, Madina Co., 51200.
$18_{II}; 18_{II} + 1_I; 19_{II}; 19_{II} + 1_I; 20_{II}$	Texas, Webb Co., 88-41.

large portion of the taxon's range, and when I reexamined the specimens from these populations, I could find no correlation of morphologic characters with chromosome number. It is my opinion, therefore, that these populations are all part of a single taxon, and there is no reason to recognize more than one entity.

These chromosome numbers, except for $2n=20_{II}$, are within the range of other numbers reported for members of the Gaillardinae. It has been my observation, however, that the chromosomes in *Amblyolepis setigera* are ca. twice as large as those I have seen in *Gaillardia*, *Helenium*, *Hymenoxys*, and *Tetraneuris* E. Greene. Furthermore, judging from configurations of bivalents at diakinesis and metaphase, *A. setigera* appears to have more metacentric and fewer acrocentric or telocentric chromosomes than the above mentioned genera.

Amblyolepis is included in subtribe Gaillardinae and placed close to *Helenium* by most workers, mainly because of its truncated style branches and apparently naked receptacle (Correll and Johnston 1970; Robinson 1981). I find, however, that the receptacle almost always has persistent projections subtending the central disc florets, and rarely there are even a few chaffy scales subtending some of the outer disc florets. It is my overall impression from morphologic, chemical, and cytologic evidence that *Amblyolepis* is very different from the other genera in this subtribe; however, I have retained it here because of the chloroplast DNA work (Kim et al. 1989) indicating that it is in fact most closely related to taxa in the Gaillardinae and that its affinities may lie with *Hymenoxys*.

TAXONOMY

AMBLYOLEPIS DC., Prodr. 5:667–668. 1836.—TYPE: *Amblyolepis setigera* DC.—*Helenium* L. sect. *Amblyolepis* (DC.) Benth., J. Linn. Soc. (Bot.) 13:335. 1873.

AMBLYOLEPIS SETIGERA DC., Prodr. 5:667–668. 1836.—TYPE: United States, Texas, “de Bejar & Austin,” [between San Antonio and Austin] 1828, *J.L. Berlandier 1830* (holotype, G-DC No. 1613!).—*Helenium setigerum* (DC.) Britt. & Rusby, Trans. N.Y. Acad. Sci. 7:11. 1887.

Plants annual, 1–6 dm tall. Stems 1 to usually several, unbranched or sparingly branched above, densely long-pilose at the base becoming sparingly pilose above. Leaves entire, rarely glabrous, almost always at least sparsely to moderately long-pilose, usually more densely pubescent on the margins. Basal and lower leaves oblanceolate to spatulate, narrowed at the base; middle leaves lanceolate to ovate, usually with acute apices and semiclapping bases; upper leaves when present the same shape as middle ones but smaller, or lacking and the plant essentially naked the upper one-third to one-half. Peduncles (4)8–20 cm long, expanded apically, sparsely long-pilose below becoming moderately to densely so above. Heads 1 to usually several per plant, hemispheric to globoid at anthesis, 9–17 mm high, 12–20 mm in diameter excluding the rays; heads expanding and often becoming globose in fruit, 2–3 cm in diameter. Receptacle ovoid to globoid, 4.5–6.0 mm high, 4.5–7.5 mm in diameter; appearing at first to be naked, but almost always with persistent projections subtending the central disc florets, and rarely with a few chaffy scales subtending some of the outer disc florets. Involucral bracts in two series; the outer bracts green, usually 8, 8.8–11.2 mm long, 2.5–4.6 mm wide, narrowly elliptic to lanceolate, usually free, but sometimes united at their bases, moderately to densely long-pilose, especially at the bases and on the entire margins; the inner bracts hyaline and scale-like, usually 9–12, 3.0–4.9 mm long, 1.0–2.8 mm wide, obovate, free, glabrous, margins entire to occasionally somewhat fimbriate at the apex. Ray florets carpellate, fertile, usually 8–10, but often 12–13 or rarely as many as 20; ligules yellow, glabrous, 10–22 mm long, 4.5–9.6(11.6) mm wide. Disc florets hermaphroditic, fertile; corollas yellow, glabrous, 5-lobed, narrowly funnelform to cylindric-campanulate, usually constricted into a narrower tube the lower one-third, 5.1–7.0 mm long, 1.2–1.8 mm in diameter. Achenes narrowly obconic, 3.0–4.5 mm long, 1.7–2.2(2.6) mm in diameter, strongly 10-ribbed, densely pubescent with straight, forked, antrorse hairs. Pappus scales 5–6, ovate to obovate, apex rounded to acute, acuminate, or rarely cuspidate, but not truly awned, 2.0–3.0(4.1) mm long, 1.0–2.1 mm wide. Chromosome numbers: $2n=17_{II}(?)$, 18_{II} , $18_{II} + 1_I$, 19_{II} , $18_{II} + 3_I(?)$, $19_{II} + 1_I$, 20_{II} .

Distribution. Northeastern Mexico in the states of Coahuila, Nuevo León, and Tamaulipas, and south Texas along the Rio Grande to the trans-Pecos and panhandle areas of Texas (Fig. 1), mostly in sandy or sandy loam soils. Flowering January to September, mainly March to May.

Representative and cytologic voucher () specimens.* MEXICO, Coahuila, hwy 57, 39.4 mi S of Allende, 21 May 1975, *Bierner and Rader 51213** (TEX); 28 mi N of Allende, 21 May 1974, *Powell and Turner 2730** (LL, US). Nuevo León, Mamulique Pass, 20 mi S of Sabinas Hidalgo, 16 Mar 1976, *Whalen 333** (LL). Tamaulipas, 14 mi S of Nuevo Laredo, 24 Mar 1944, *Heard and Barkley 14596* (TEX, US).

USA, Texas, Andrews Co., ca. 11 mi SW of Andrews, 27 Apr 1961, *Correll and Rollins 23920* (LL). Brewster Co., Chisos Mts, 15 Mar 1941, *Warnock 440* (LL, TEX). Coleman Co., hwy 283 S of Santa Anna, 7.1 mi N of the Colorado River, 10 Apr 1988, *Bierner 88-16** (TEX). Comal Co., Comanche Spring, New Braunfels, May 1850, *Lindheimer 854* (MO, NY, TEX, US). Gillespie Co., Stonewall, 17 Apr 1954, *Turner 3376** (TEX). Hidalgo Co., 3 mi N of La Joya, 8 Jun 1941, *Runyon 2747* (TEX). Howard Co., Big Springs, 11 May 1902, *Tracy 7887* (MO, NY, TEX, US). Irion Co., 1 mi S of Mertzon, 24 Apr 1948, *Warnock 7696* (LL, TEX). Jim Hogg Co., 5 mi E of Hebbronville on hwy 285, 17 Mar 1963, *Chavez et al. 48* (LL, TEX). Jim Wells Co., 10 mi N of Premont on hwy 281, 31 Mar 1963, *Gamboa and Dohnke 142* (TEX). Jones Co., 1.8 mi E and 1.6 mi W of hwy 1226 on hwy 180 (jct in Funston), 10 Apr 1988, *Bierner 88-10** and *88-12** (TEX); 8.2 mi W of hwy 277 on hwy 180 (jct in Anson), 10 Apr 1988, *Bierner 88-13** (TEX). Karnes Co., 0.3 mi W of hwy 123 on hwy 81, 14 Apr 1988, *Bierner 88-20** (TEX); 3.9 mi SW of hwy 81 on hwy 181 (jct in Hobson), 14 Apr 1988, *Bierner 88-24** (TEX). Kent Co., 2 mi E of Clairemont on hwy 380, 18 May 1959, *Correll and Johnston 22096* (LL). Kinney Co., 2–3 mi W of Brackettville, 30 Mar 1960, *Gentry and Barclay 18467* (LL, US). Kleberg Co., Kingsville, 11 Apr 1905, *Tracy 8956* (MO, NY, TEX, US). Live Oak Co., 5.1 mi SW of hwy 281 on hwy 59, 24 Mar 1976, *Bierner and Harborne 51520** (TEX); 3 mi N of hwy 534 on hwy 796, 14 Apr 1988, *Bierner 88-28** (TEX). Llano Co., 6.7 mi W of hwy 1431 on hwy 29 between Burnet and Llano, 8 Apr 1988, *Bierner 88-1** (TEX). Lubbock Co., Shallowater, 15 Jun 1926, *Studhalter 1225* (LL). McCulloch Co., hwy 283 N of Fife, 0.2 mi and 1.5 mi S of the Colorado River, 10 Apr 1988, *Bierner 88-17** and *88-18** (TEX). Medina Co., S of Devine, 2.2 mi NW of hwy 472 on hwy 173, 18 May 1975, *Bierner and Rader 51200** (TEX). Midland Co., Midland, 8 May 1902, *Tracy 7833* (MO, NY, TEX, US). Nolan Co., Sweetwater, 6 Jun 1926, *Palmer 30480a* (MO, TEX). Randall Co., Canyon, 20 May 1931, *Neelley s.n.* (TEX). Reeves

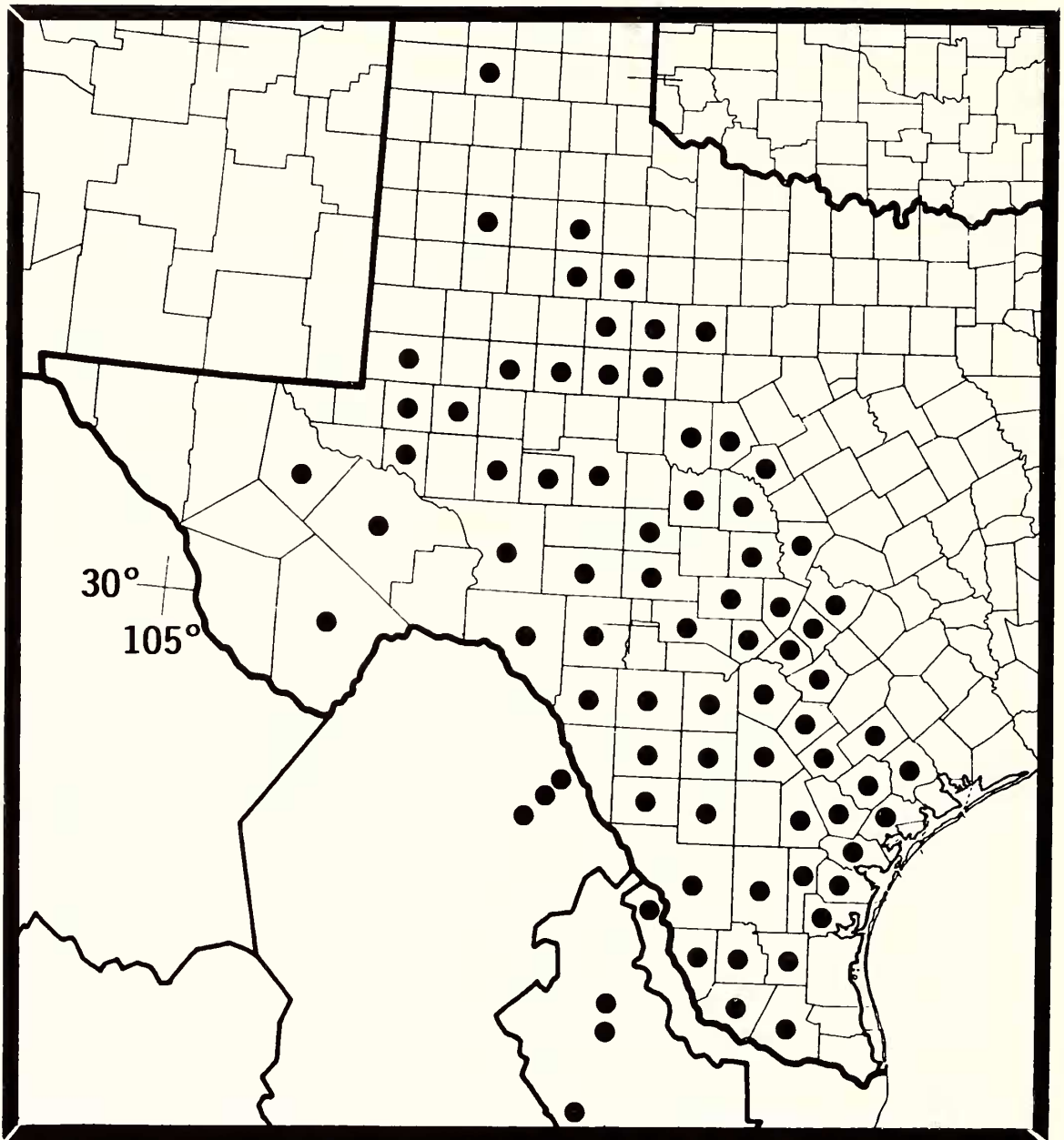


FIG. 1. Distribution of *Amblyolepis setigera*.

Co., vicinity of Pecos, 9 Jun 1931, *Gillespie 5266* (US). Refugio Co., Refugio, 8 Mar 1916, *Palmer 9109* (MO). San Saba Co., 1.3 mi S of hwy 190 on hwy 16 (jct in San Saba), 8 Apr 1988, *Biernier 88-3** (TEX); 0.3 mi S of the San Saba-Mills Co. line on hwy 16, 8 Apr 1988, *Biernier 88-5** (TEX), Sutton Co., Sonora, 23 May 1929, *Wright 5* (TEX). Travis Co., Colorado River opposite Deep Eddy in Austin, 26 Apr 1936, *Tharp 44500* (NY). Val Verde Co., 8.3 mi N of hwy 90 on hwy 163 (jct in Comstock), 16 Apr 1988, *Biernier 88-45** (TEX). Victoria Co., 10 mi SW of Victoria along hwy 59, 9 Apr 1964, *Gentry and Smith 20525* (US). Webb Co., 22.6 mi NW of IH-35 on hwy 83, 15 Apr 1988, *Biernier 88-41** (TEX). Zavala Co., Crystal City, 14 Jun 1928, *Tharp s.n.* (TEX).

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NOTEWORTHY COLLECTIONS

WYOMING

CHLORIS VERTICILLATA Nutt. (POACEAE).—Goshen Co.: Fort Laramie National Monument, 12 mi SE of Guernsey, in relatively undisturbed steppe near visitor's center with *Bouteloua*, *Buchlœ*, and *Setaria*, T26N R64W S20, 1310 m, 23 Sep 1989, Snow 5764 (RM).

Significance. First record for WY and a range extension westward of ca. 100 km from Dawes Co., Nebraska.—NEIL SNOW, Department of Botany, University of Wyoming, Laramie, WY 82071-3165.